

1 CLAIMS:

2 1. A system for sensing and recording or transmitting processing conditions  
3 comprising:

4 a substrate having a surface, the substrate comprising sensors to measure the  
5 processing conditions of the substrate at different areas of the substrate; and

6 one or more electronics platforms mounted to the surface of the substrate  
7 comprising signal acquisition circuitry coupled to an output of the sensors.

1 2. The system of claim 1 wherein each of the one or more platforms  
2 comprise one or more legs and a shelf, the one or more legs elevating the shelf from the  
3 surface.

1 3. The system of claim 2 wherein the signal acquisition circuitry is upon the  
2 shelf.

1 4. The system of claim 1 wherein the substrate is a wafer.

1 5. The system of claim 1 wherein the substrate comprises glass.

1 6. The system of claim 1 further comprising a remote data processing  
2 module.

3 7. The system of claim 2 wherein the electronics platform further comprises  
4 data transmission circuitry comprising a transceiver, the data transmission circuitry  
5 operable to transmit the processing conditions in real time during measurement of the  
6 processing conditions to the data processing module via the transceiver.

1           8.       The system of claim 7 wherein the transceiver transmits and receives RF  
2 signals.

1           9.       The system of claim 7 wherein the transceiver transmits and receives IR  
2 signals.

1           10.      The system of claim 7 wherein the transceiver inductively transmits and  
2 receives.

1           11.      The system of claim 7 wherein the transceiver sonically transmits and  
2 receives.

1           12.      The system of claim 7 wherein the system further comprises a data  
2 transmission cable and wherein the data transmission circuitry transmits the processing  
3 conditions over the cable.

1           13.      The system of claim 7 wherein the data transmission circuitry is further  
2 operable to send and receive control signals to and from the data processing module.

1           14.      The system of claim 6 wherein the data processing module comprises a  
2 microprocessor, a storage device, a display, and an input device.

1           15.      The system of claim 1 wherein the processing conditions measured by the  
2 sensors comprise one or more of the following conditions: temperature, pressure, flow  
3 rate, vibration, ion current density, ion current energy, and light energy density.

4           16.      The system of claim 1 wherein the sensors are discrete sensors mounted in  
5 or on the wafer.

1           17.     The system of claim 1 wherein the sensors are part of an integrated circuit  
2     formed in or on the wafer.

1           18.     The system of claim 1 wherein the electronics platform further comprises  
2     a power supply.

1           19.     The system of claim 17 wherein the power supply comprises an inductive  
2     power source.

1           20.     The system of claim 1 further comprising an antenna connected to the  
2     wafer and electrically coupled to the signal acquisition circuitry.

1           21.     A process condition monitoring device comprising:  
2             a substrate having a first perimeter, the substrate comprising sensors to measure  
3     the processing conditions of the substrate at different areas of the substrate; and  
4             an electronics module having a second perimeter, the module comprising:  
5                 signal acquisition circuitry coupled to an output of the sensors;  
6                 data transmission circuitry coupled to the signal acquisition circuitry;  
7             a power source; and  
8             leads connecting the substrate to the electronics module for transmitting signals  
9     between the substrate and the electronics module.

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1           22.     The monitoring device of claim 21 wherein the signal acquisition circuitry  
2     is configured to amplify an output signal of the sensors.

1           23.     The monitoring device of claim 21 wherein the data transmission circuitry  
2     comprises a micro-controller and is configured to correct the output signal using sensor  
3     calibration coefficients.

1           24.     The monitoring device of claim 22 wherein the signal acquisition circuitry  
2     is further configured to provide an input signal to the sensors.

1           25.     The monitoring device of claim 24 wherein the input signal comprises  
2     input power.

1           26.     The monitoring device of claim 21 further comprising a remote data  
2     processing system, and wherein the data transmission circuitry comprises a wireless  
3     transceiver to transmit the processing conditions to the remote system.

1           27.     The monitoring device of claim 22 wherein the data transmission circuitry  
2     comprises an analog to digital converter.

1           28.     The monitoring device of claim 21 wherein the data transmission circuitry  
2     comprises memory, and wherein the data transmission circuitry stores processing  
3     conditions in the memory.

1           29.     The monitoring device of claim 26 wherein the remote system is  
2     configured to adjust the output signal using calibration coefficients.

1           30.     The monitoring device of claim 21 wherein the transceiver transmits and  
2     receives RF signals.

1           31.     The monitoring device of claim 21 wherein the transceiver transmits and  
2     receives IR signals.

1           32.     The monitoring device of claim 21 wherein the transceiver transmits and  
2 receives sonic signals.

1           33.     The monitoring device of claim 21 wherein the data transmission circuitry  
2 comprises one or more connectors to couple a remote system to the device with a  
3 communications cable.

1           34.     The monitoring device of claim 26 wherein the remote system is a  
2 microprocessor controlled device.

1           35.     The monitoring device of claim 21 wherein the processing conditions  
2 measured by the sensors comprise one or more of the following conditions: temperature,  
3 pressure, flow rate, vibration, ion current density, ion current energy, and light energy  
4 density.

1           36.     The monitoring device of claim 21 wherein the flexible cable is a ribbon  
2 cable.

1           37.     A device for monitoring processing conditions to be inserted by a robot  
2 hand into a sealed chamber, the device comprising:

3           a first member comprising sensors;

4           a second member comprising electronics;

5           a conductive cable or conductors connecting the first and second members,

6           wherein the first and second members fit into or onto a robot hand or hands, and

7           wherein the device can be extended to a second position by the robot hand such

8           that the first member is inside the sealed chamber and the second circular member is

9 outside the chamber, thereby not subjecting the electronics of the second member to the  
10 conditions within the chamber.

1 38. The device of claim 37 wherein in the second position the cable of the  
2 device is sealed at a door of the chamber.

1 39. The device of claim 37 wherein the electronics comprise a power supply,  
2 and an amplifier.

1 40. The device of claim 39 wherein the electronics further comprise a  
2 transceiver for communicating to a data processing device.

1 41. The device of claim 39 wherein the electronics further comprise an  
2 analog-to-digital converter.

1 42. The device of claim 37 wherein the device further comprises a data  
2 processing computer coupled to the second circular member.

1 43. The device of claim 37 wherein the first and second members are circular  
2 or rectangular.

1 44. The system of claim 1 wherein the electronics platform is mounted to a  
2 recessed portion of the surface of the substrate, wherein the recessed portion and the  
3 platform are within a cavity and wherein the platform is substantially equal in mass to the  
4 removed cavity.

1 45. The process condition of claim 21 wherein in a first position the  
2 electronics module is above or below the substrate, and in a second position the

- 3 electronics module and the substrate are displaced from each other such that the first and
- 4 second perimeter do not intersect.